

Study of some risk factors and C - reactive protein levels among patients with cardiovascular diseases

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المستخلص

الهدف: دراسة تأثير بعض عوامل الخطورة كالعمر والتدخين وداء السكري عند المرضى الذين يعانون من بعض الأمراض القلبية الوعائية (كالذبحة الصدرية واحتشاء العضلة القلبية) فضلاً عن تقييم مستوى البروتين الفعال © في مصول هؤلاء المرضى. **منهجية البحث:** أجريت هذه الدراسة على (١٠٠) من المرضى الراقدين في المركز العراقي للأمراض القلب. (١٦) من المصابين باحتشاء العضلة القلبية و(٧٩) لمرضى الذبحة الصدرية أو بكليهما (٥)، لمدّة من شهر أيلول ٢٠٠٩ إلى حزيران ٢٠١٠. تمّت مقارنة نتائج هؤلاء المرضى مع نتائج (٣٠) شخصاً سليماً ضمن نفس الفئة العمرية كمجموعة ضابطة. تمّ جمع المعلومات عن المرضى الذين تأكد تشخيصهم من قبل أطباء اختصاصيين عن طريق استمارات الاستبيان التي تضمّنت معلومات عن العمر والجنس والتدخين. تمّ سحب عينات من الدم الوريدي للمرضى وللمجموعة الضابطة لقياس تركيز سكر الدم وكذلك تركيز البروتين الفعال ©.

النتائج: أظهرت النتائج بليّ الذكور المصابين بالذبحة الصدرية يشكلون الغالبية وضمن الفئة العمرية (٥١-٦٠) سنة حيث ظهرت فروقات معنوية بين الذكور والإناث. كما بينت الدراسة أنّ الإصابة بالأمراض القلبية الوعائية هذه كانت أعلى بين غير المدخنين. وكشفت الدراسة بأن غالبية المصابين بالذبحة الصدرية واحتشاء العضلة القلبية هم من المصابين بداء السكري. ولخيراً، بينت الدراسة بليّ مستويات البروتين الفعال © بين المرضى المصابين بالذبحة الصدرية واحتشاء العضلة القلبية كانت أعلى من مستوياتها في المجموعة الضابطة وبفروقات ذات دلالة معنوية عالية. **التوصيات:** بعد اتمام هذه الدراسة، نوصي بدراسة عينات أكبر من المرضى لتأكيد نتائجها وكذلك دراسة عوامل خطورة أخرى كارتفاع ضغط الدم ومؤشر كتلة الجسم وصورة دهون الدم لأهميتها.

Abstract

Objective : To study the effect of some risk factors like age, smoking and *Diabetes mellitus* (DM) among patients with certain cardiovascular diseases (Angina pectoris and Myocardial infarction), in addition to the assessment of the C-reactive protein (CRP) in the sera of those patients.

Methodology: The study was carried out on (100) subjects who were hospitalized in the Iraqi Center of heart Diseases in Baghdad city and were suffering from Myocardial Infarction (MI) (16) and Angina Pectoris (AP) (79) or from both (5) over a period from September 2009 to June 2010. The results of patients were compared with those of (30) healthy and age-matched individuals as a control group. Data were obtained from patients who were already diagnosed by specialists through the use of questionnaire forms including information about age, gender and smoking. Venous blood samples were collected from both the patients and control group to estimate the levels of blood glucose and C-reactive protein.

Results: Statistical results showed that the majority of angina patients were males within the age group (51-60) years with significant differences between males and females. The study also demonstrated that the incidence of (MI) and (AP) was higher among non-smokers in comparison with smokers. The study indicated that the majority of patients with (MI) and (AP) were diabetic. Finally, the study showed that the levels of C-reactive protein among (MI) and (AP) patients were higher than its level among the control group with a highly significant difference.

Recommendations: A large size of sample is recommended to be studied to confirm the results of this study. Study of other factors such as hypertension, body mass index and lipid profile may be of value.

Keywords: Cardiovascular disease; Diabetes mellitus; Smoking; Risk factors; C-Reactive protein

Introduction

Hear disease is currently the number one cause of death for both men and women in the United States and in many other countries. Studies show that nine factors contribute to a significant percentage of heart attacks: smoking, abnormal lipoprotein ratios, high blood pressure, diabetes, obesity, low fruit and vegetable consumption, exercise and stress ⁽¹⁾.

Angina pectoris has a wide range of clinical expressions. The most often associated symptoms to angina are substernal chest pressure or tightening, frequently with radiating pain to the arms, shoulders or jaw. The symptoms may also be associated with shortness of breath, nausea or diaphoresis. Symptoms stem from inadequate oxygen delivery to myocardial tissue ⁽²⁾.

Classical symptoms of acute myocardial infarction include sudden chest pain, shortness of breath, nausea, vomiting, palpitations, sweating and anxiety ⁽³⁾. Among the diagnostic tests available to detect

heart muscle damage are an electrocardiogram (ECG), electrocardiography , and various blood tests ⁽⁴⁾.

C-Reactive protein (CRP) is a sensitive marker of systemic inflammation, and prospective data from population of apparently healthy men indicate that baseline levels predict risk of first myocardial infarction ⁽⁵⁾. Specifically, among men free of prior cardiovascular disease participating in the physicians' health study, many studies

recently reported that those with baseline levels of CRP in highest quartile had a three folds increase in risk of developing future MI compared with those with levels in the lowest quartile as such these data demonstrate that CRP is a marker of cardiovascular risk not only among those with static and unstable angina, elderly and selected high risk patients, but also among individuals with no current evidence of cardiovascular disease ⁽⁶⁻¹⁰⁾. Therefore, in this study, we examined patients from Iraqi Center of Heart Diseases who were suffering from (MI&AP) or both to study some risk factors like age, smoking, diabetes as well as to assess CRP levels among them.

Methodology

A prospective study was conducted at The Iraqi Center Of Heart Diseases on (100) recently diagnosed (16) myocardial infarction (MI), (79) angina pectoris (AP) and (5) both (MI&AP) patients, compared with (30) healthy control group whose ages and sexes were nearly similar to the patient's group. For each patient and control, Electrocardiogram (ECG) was done, and medical examination by specialists in the center was made to confirm the diagnosis of each medical condition.

Venous blood samples were obtained immediately after diagnosis from each patient to measure the levels of blood sugar and C-reactive protein. Blood sugar was measured by routine enzymatic kit method, while high sensitivity CRP was measured by latex test. In this assay, latex

beads coated with mouse monoclonal antibodies bind CRP present in the serum sample and form agglutination.

Data were analyzed statistically using Levene's test for quality of variances, analysis of variance (ANOVA) for quality means, least significant

difference (LSD) for multiple comparisons after analysis of variance, and mean standard deviation, standard error 95% confidence intervals for population mean value as well as Fisher's exact tests by using the SPSS (version 10) program.

Results

Table 1. Distribution of 100 patients with MI + AP and 30 control subjects according to their demographic characteristics

parameters	Patients		Control	
	Frequency	Percent	Frequency	Percent
MI	16	16%	0	0%
Ap	79	79%	0	0%
MI+Ap	21	21%	0	0%
Gender:				
Male	79	79%	14	46.7%
Female	21	21%	16	53.3%
Age (years):				
40 – 50	22	22%	15	50%
51 – 60	44	44%	7	23.3%
61 – 70	32	32%	5	16.7%
> 70	2	2%	3	10%
Diabetes :				
Diabetic	60	60%	0	0%
Non-diabetic	40	40%	30	100%
Smoking:				
Smokers	31	31%	0	0%
Non-smokers	69	69%	30	100%
CRP:				
Positive	80	80%	27	90%
Negative	20	20%	3	10%
Total	100	100%	30	100%

AP= Angina Pectoris; CRP = C –Reactive protein; DM = Diabetes Mellitus; MI = Myocardial Infarction

Table (1) revealed that the highest percentage (79%) of patients were males, (44%) of patients were in the age group (51-60) years,

(60%) of patients were diabetic, (69%) of the studied patients were non-smokers, and (80%) of them had positive serum CRP levels.

Table 2. Distribution of the study and control groups according to their age

Groups	Frequency	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
control	30	53.67	10.42	1.9	49.78	57.56	45	75
MI	16	56.88	7.5	1.87	52.88	60.87	45	75
AP	79	56.27	7.9	0.89	54.5	58.04	45	75
MI+AP	5	57	8.37	3.74	46.61	67.39	45	65

Std. Dev.= Standard deviation; Std. Error = Standard Error

Table 2a. Summary statistics for different study groups (Study-control) according to age factor

Testing of coincidence	Levene's Test for Equality of Variances		t-test for Equality of Means	
	L-test	Sig.	ANOVA	Significance (2-tailed)
(Study and Control)	2.143	0.098	0.823	0.483

ANOVA : Analysis of variance

Table 2b. Multiple comparisons of age groups among different groups

(I) ITEMS	(J) ITEMS	Significance
Control	MI	.226
	AP	.157
	MI+AP	.419
MI	AP	.795
	MI+AP	.977
AP	MI+AP	.852

AP= Angina pectoris; MI=Myocardial Infarction

Regarding to the effect of age on the incidence of disease, it was observed that there was no statistically significant difference among patients

with (MI, AP and MI + AP) in relation with the distribution of the ages of the control group (p>0.05).

Table 3. Distribution of the studied groups according to gender

Gender	Number and frequency (%)	Study group			
		Control group	MI	AP	MI + AP
Male	No.	14	14	64	1
	%	46.7	87.5	81	20
Female	No.	16	2	15	4
	%	53.3	12.5	19	80
Total	No.	30	16	79	5
	%	100	100	100	100
C.S P-value			P = 0.007 HS	P = 0.001 HS	P = 0.272 NS

AP= Angina pectoris; CS=Comparative Significance; HS : Highly significant; MI= Myocardial infarction; No= Number; %=Percent; NS=Non-significant

According to gender distribution. The results show that there was a highly significant difference ($p < 0.05$) in the incidence of (MI) and (AP) disease among males (87.5%) and (81%)

respectively when compared with the control group (46.7%). While, no significant difference was found in gender distribution between (MI and AP) group and control group ($p > 0.05$).

Table 4. Effect of smoking on the frequencies of cardiovascular diseases

Smoking	No. and frequency	Study group				Total No. of patients
		Control group	MI	AP	MI +AP	
Smokers	No.	0	5	26	0	31
	%	0	31.3	32.9	0	31
Non-smokers	No	30	11	53	5	69
	%	100	68.8	67.1	100	69
Total	No	30	16	79	5	100
	%	100	100	100	100	100
C.S P-value			P = 0.003 HS	P = 0.000 HS	OC	-----

CS=Comparative Significance; HS=Highly Significant; No=Number; OC=Out of comparison (Coincidence); P= Level of Probability

This table revealed that the percentage of non-smokers formed most of the studied patients (69%) when compared with smokers (31%), particularly among AP patients (53%). The

table also showed that there was a highly significant difference between cardiovascular diseases and control group ($p < 0.05$).

Table 5. Effect of Diabetes Mellitus on the frequencies of cardiovascular diseases

Diabetes mellitus	No. and frequency	Study group				Total No. of patients
		Control group	MI	AP	MI +AP	
Diabetic	No.	0	8	27	3	38
	%	0	50	34.2	60	38
Non-diabetic	No	30	8	52	2	62
	%	100	50	65.8	40	62
Total	No	30	16	79	5	100
	%	100	100	100	100	100
C.S P-value			P = 0.000 HS	P = 0.000 HS	P = 0.002 HS	-----

AP= Angina pectoris; CS=Comparative Significance; HS=Highly Significant; MI= Myocardial infarction; No=Number;); P= Level of Probability

The effect of Diabetes Mellitus (DM) on induction of heart diseases was shown in table (5). It was clear from this table that there was a high frequency (60%) of diabetic patients among

(MI and AP) patients. All three groups of patients demonstrated a highly significant variation with the control group concerning diabetes ($p < 0.05$).

Table 6. Distribution of patients according to CRP positivity

C-Reactive protein	No. and frequency	Study group				Total No. of patients
		Control group	MI	AP	MI +AP	
Positive	No.	3	6	34	4	44
	%	10	37.5	43	80	44
Negative	No	27	10	45	1	56
	%	90	62.5	57	20	56
Total	No	30	16	79	5	100
	%	100	100	100	100	100
C.S P-value			P = 0.001 HS	P = 0.000 HS	P = 0.000 HS	-----

AP= Angina pectoris; CS=Comparative Significance; HS=Highly Significant; MI= Myocardial infarction; No=Number;); P= Level of Probability

Detection of C-reactive protein showed a high frequency of positive samples (80%) among (MI & AP) group with a highly significant difference when

Discussion

Data of this study were obtained from a group of patients suffering from myocardial infarction and angina pectoris or both. The study depended on determining the effect of age, gender, diabetes, smoking on certain cardiovascular diseases as well as assessing the CRP values among them.

Regarding to gender distribution, the study reveals that most patients are males, with predominance of angina patients. A result that agrees with the collaborative study that found lower prevalence in women than men due to their metabolic differences, but we may attribute this finding to the fact that women usually refuse hospitalization ^(11- 12).

The study demonstrates that the majority of patients are among the age group (51-60) years, which coincides with the findings a study states that the cause of most frequently complications such as diabetes, hypertension and cardiovascular diseases happens in this age group. However, our study reveals no significant variation between the ages of the studied patients and the control group ⁽¹³⁾.

compared with other groups. The same results were found in CRP levels among cardiovascular diseases when compared with the control group (p<0.05).

Data obtained from our results indicates that most patients are non-smokers. This result disagrees with a study that found increased cardiac events in smoker males. We may explain the present result to that not only smoking, but also several other risk factors may cause cardiovascular diseases including hypertension, hyperlipidemia, obesity, exercise...etc, and that the patients may be smokers at past ⁽¹⁴⁾.

The effect of diabetes mellitus on induction of heart diseases shows that most of patients are diabetic. However, this finding agrees with that of a study stated that hyperglycemia dependently increased infarct size and abolished protection afforded by ischemic preconditioning ⁽¹⁵⁾, and studies that showed that hyperglycemia has proinflammatory reaction, which plays an important role in inducing the release of cytokines and associated with increased mortality from MI ^(16- 17).

Results of CRP detection reveal high frequency positive samples among (MI) and (AP) group in comparison with the control group. A result which is confirmed by studies that reported that inflammatory markers such as CRP reflect the extent of myocardial necrosis and

correlate with cardiac outcomes following acute myocardial infarction⁽¹⁸⁻²⁰⁾.

The present study shows that male patients aged (51-60) years have the highest prevalence of cardiovascular diseases due to most frequently complications of this age group and to metabolic differences between males and females.

Unfortunately, non-smoker cardiovascular patients are higher than smokers in our study, a result that may attribute the occurrence of such diseases to risk factors other than smoking including hypertension, hyperlipidemia or obesity.

Most of the patients in our study are diabetic because hyperglycemia has effect on induction of heart diseases.

Finally, the levels of C-Reactive protein are higher among cardiovascular patients due to the correlation of this inflammatory marker with cardiac necrosis.

Recommendations

This study has been performed on a number of cardiovascular patients to find out their correlation with some risk factors. Therefore, a large size of sample is recommended to be studied to confirm the results of this study. Study of other factors such as hypertension, body mass index and lipid profile may be of value.

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